## (19) World Intellectual Property Organization

International Bureau



## 

(43) International Publication Date 29 December 2004 (29.12.2004)

PCT

## (10) International Publication Number WO 2004/113769 A3

(51) International Patent Classification<sup>7</sup>: F16J 15/40

(21) International Application Number:

PCT/US2004/019495

(22) International Filing Date: 18 June 2004 (18.06.2004)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

60/480,146

20 June 2003 (20.06.2003) US

(71) Applicant (for all designated States except US): EL-LIOTT COMPANY [US/US]; 901 North Fourth Street, Jeannette, PA 15644-1473 (US).

(72) Inventors; and

- (75) Inventors/Applicants (for US only): LI, Jiming [CN/US]; 140 Monticello Drive, Monroeville, PA 15146 (US). DE CHOUDHURY, Pranabesh [US/US]; 1354 Conway Street, Greensburg, PA 15601 (US).
- (74) Agents: BYRNE, Richard, L. et al.; Webb Ziesenheim Logsdon Orkin & Hanson, 700 Koppers Building, 436 Seventh Avenue, Pittsburgh, PA 15219-1818 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

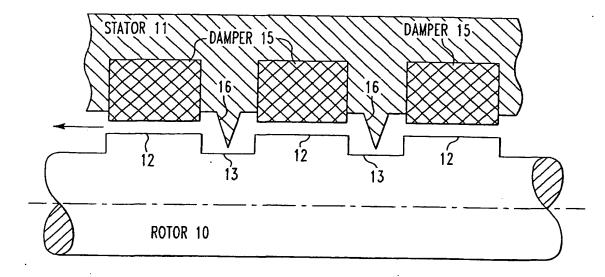
## Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments
- (88) Date of publication of the international search report:

  1 September 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: STEPPED LABYRINTH DAMPER SEAL



(57) Abstract: An apparatus (Fig. 1) for restricting axial leakage flow through the clearance between a rotating shaft (10) and a seal stator (11) comprises a stepped shaft surface (12,13) and seal stator (11) having a plurality of damper sections (15) and being interleaved and adjacent.